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2. General survey

The Visulex camera system LumiCam consists of remote controlled cameras for Ex- and non-Ex-ranges, the camera control devices and the control software for Windows computers. Furthermore, cameras for direct connection to a monitor or a video-server are part of our product range.

Cameras for hazardous areas (Ex) are K25-Ex, K07-Ex, K06-Ex and K55-Ex (pressure-proof housing). Cameras for non-hazardous areas (non-Ex) are K15, K35 and K55. All cameras will be mounted with the mounting bracket (part of the delivery), excluded the camera K35. The K35 will be mounted with a collar adapter / mounting flange on a screwed sight glass fitting (separate order necessary).

You can either obtain a PAL or an NTSC camera edition.

For short distance up to 100 m between camera and monitor, a passive transmission system will be used (K15-coax, K55 and K55-Ex). For longer distance between 100 m up to 500 m an active transmission system will be used.

The control units (small and large) vary in the number of cameras. The small rack is for one camera, the large rack could be used for maximum six cameras. Both racks could be connected to an Ethernet via video-server.

Each control unit has a microprocessor system, which is connect via current interface to another microprocessor system inside the camera housing. This microprocessor (inside the housing) is connect to a serial port of the camera module.

The basic function of the camera, like zoom and focus could be controlled by the control unit. Furthermore, special functions could be activated or deactivated by the function keys.

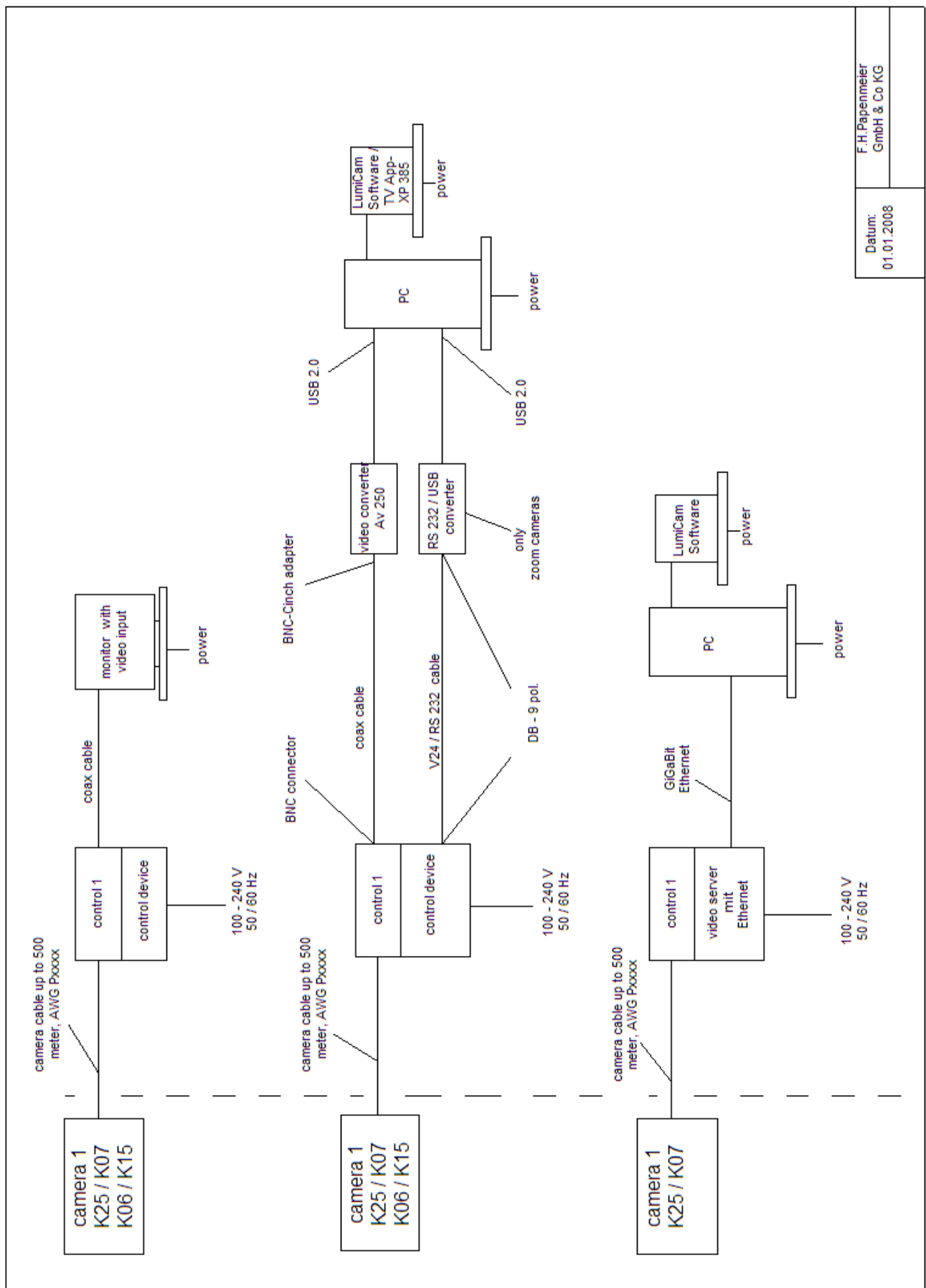
The complete camera control could be done with the LumiCam software (windows computer). The computer is connected to the camera rack via Ethernet (special module) or via serial port.

The video signal of each camera is available at a BNC output at the backside of the camera rack. Furthermore, the large camera rack owns a reversible BNC output.

The video image could be shown on a video monitor or a computer.

You have different possibilities to feed the video signal into the PC. You can use a video-web-server (external part) or a network interface module which will be mounted inside the rack.

3. System survey



4. Cameras

The Lumiglas Cameras are shippable for the colour systems PAL (CCIR) and NTSC (EIA).

The zoom cameras run with a 1/4"-CCD system, the fixed focus lens run with a 1/3"-CCD system. Both systems can be used at a light intensity of at least 2 lux.

The PAL-cameras working with 440.000 pixels at a resolution of 460 horizontal lines. The NTSC-cameras working with 380.000 pixels at a resolution of 470 horizontal lines.

In additional to the optical zoom (10x), the cameras have a digital zoom (4x).

The Visulex camera systems K25-Ex, K07-Ex, K06-Ex, K15Z and K35Z are available for the active transmission system. The cameras K15-coax, K55 and K55-Ex are available as passive transmission system for maximum 100 m distance between camera and monitor.

At the active transmission system, the camera is equipped with a video transmitter and the control unit is equipped with a video amplifier card. By the adjustment possibilities, a concerted overhaul of the received video signal is possible. Because of that you can use the active transmission system for distance between camera and rack up to 500 m. The active transmission system is marked with an **E** on the label of the camera behind the part number.

The passive transmission system is only for distance between camera and monitor up to 100 m. The video signal is transferred via coax cable to the monitor.

If the camera signal should be transferred to a video-server via Ethernet connection, you have to use a video-web-server. As alternative you also could use an active transmission system for distance under 100 m.

4.1 Camera K25-Ex



K25-Ex / P-E-Z

(PAL zoom camera with active transmission system inside a housing for hazardous areas)

The Visulex Camera K25-Ex is for applications in potentially explosive environments for control and remote monitoring of processes and for places which have to be observed. The flameproof enclosure, stainless steel housing is for hazardous areas gas zones 1 and 2, as well as dust zones 21 and 22. A 5m long connection cable is mounted at the camera. This cable is connected to a terminal box, from which the remaining cable have to be connected (max. 500m).

Available Camera types:

- K25-EX / P-Z-E - PAL zoom camera with active transmission system
- K25-EX / N-Z-E - NTSC zoom camera with active transmission system

4.2 Camera K07-Ex



K07-Ex / P-E-Z

(PAL zoom camera with active transmission system inside a housing for hazardous areas)

The Visulex Camera K07-Ex is for applications in potentially explosive environments for control and remote monitoring of processes and for places which have to be observed. The flameproof enclosure, aluminum housing is for hazardous areas gas zones 1 and 2, as well as dust zones 21 and 22. The cable must be connected inside the integrated terminal box.

Available Camera types

K07-EX / P-Z-E - PAL zoom camera with active transmission system

K07-EX / N-Z-E- NTSC zoom camera with active transmission system

4.3 Camera K06-Ex



K06-Ex / P-E

(PAL fixed focus lens camera with active transmission system inside a housing for hazardous areas)

The Visulex Camera K06-Ex is for applications in potentially explosive environments for control and remote monitoring of processes and for places which have to be observed. The flameproof enclosure, aluminum housing is for hazardous areas gas zones 1 and 2, as well as dust zones 21 and 22. The cable must be connected inside the integrated terminal box.

Available Camera types:

K06-EX / P-Z-E - PAL fixed focus lens camera with active transmission system

K06-EX / N-Z-E - NTSC fixed focus lens camera with active transmission system

Objective: 28°, 29°, 54°, 60°, 78°, 90° or 120°

4.4 Camera K55-Ex



K55-Ex / P-D

The Visulex Camera K55-Ex is for applications in potentially explosive environments for control and remote monitoring of processes and for places which have to be observed. The flameproof enclosure, stainless steel housing is for hazardous areas gas zones 1 and 2, as well as dust zones 21 and 22. The camera is connected to the terminal box with a special combined cable (video signal and power supply).

Available Camera types:

K55-EX / P-D PAL fixed focus lens camera passive transmission system

K55-EX / N-D NTSC fixed focus lens camera passive transmission system

Objective: 28°, 29°, 54° or 60°

4.5 Camera K15 “non-Ex”



K15 P-E

The Visulex camera K15 and K35 are used for control and remote monitoring of processes and for places which have to be observed (e.g. aseptic environments). At the stainless steel housing is a mounting bracket and the cable have to be connected through a cable gland at the housing.

Available Camera types:

- K15 P-E-Z - PAL zoom camera with active transmission system
- K15 P-E-F - PAL fixed focus lens camera with active transmission system
- K15 N-E-Z - NTSC zoom camera with active transmission system
- K15 N-E-F - NTSC fixed focus lens camera with active transmission system
- K15 P-D-F - PAL fixed focus lens camera with passive transmission system (max. 100m)

4.6 Camera K55 “non-Ex”



K55 P-D

The Visulex camera K55 is for control of processes and for places which have to be observed (e.g. aseptic environments). At the stainless steel housing is a mounting bracket and. The cable has to be connected to the terminal box (max. 100m).

Available Camera types:

K55 / P-D PAL camera with fixed focus lens with passive transmission system
K55 / N-D NTSC camera with fixed focus lens with passive transmission system

Objective: 28°, 29°, 54° or 60°

Connection cable



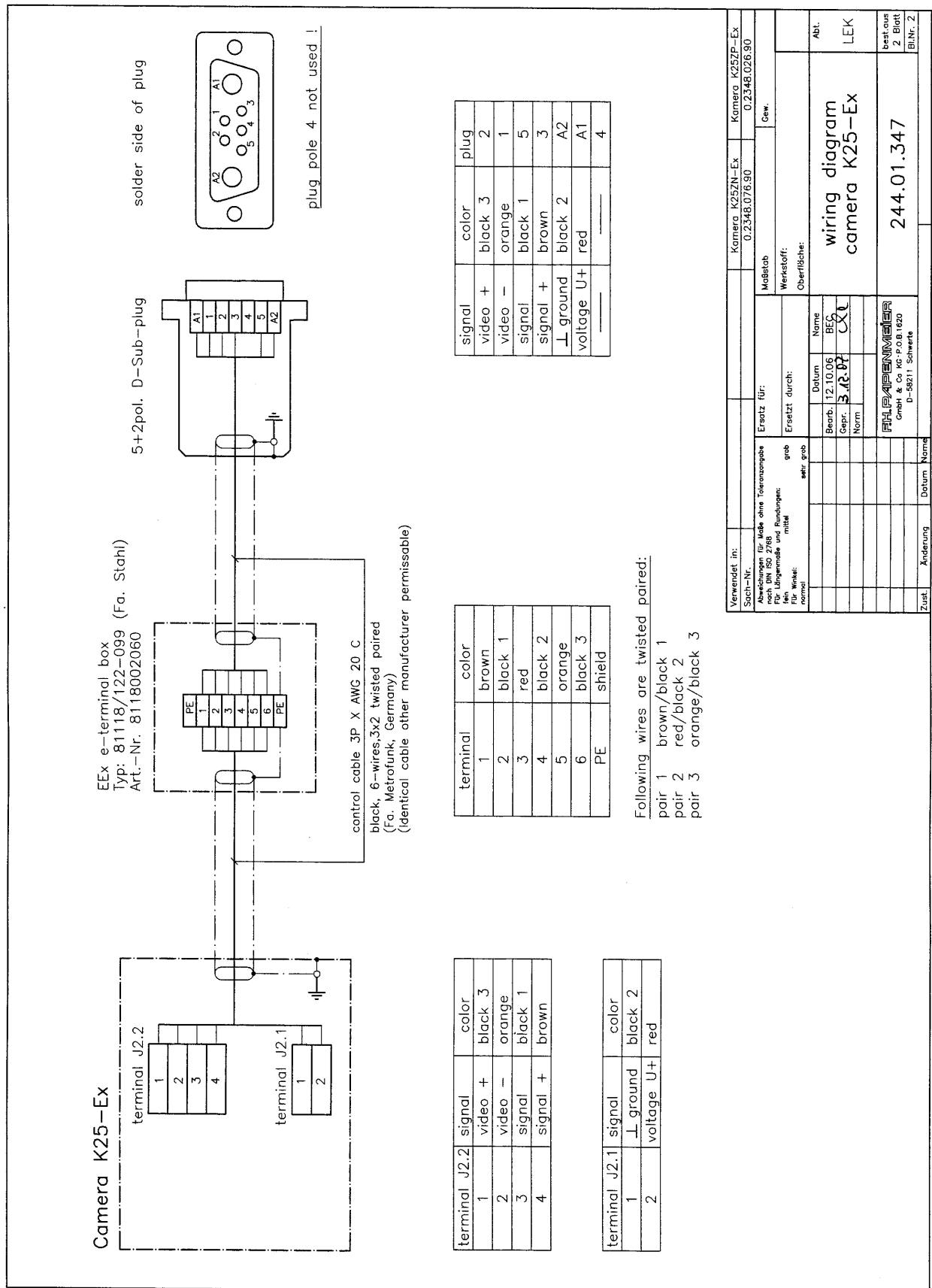
3Px AWG 20C

The default cameras are delivered with connected cable (desired length and soldered D-sub-connector). If the cable laying is piped, the components can also be delivered individually. In this case, the connection is done according to the terminal diagrams.

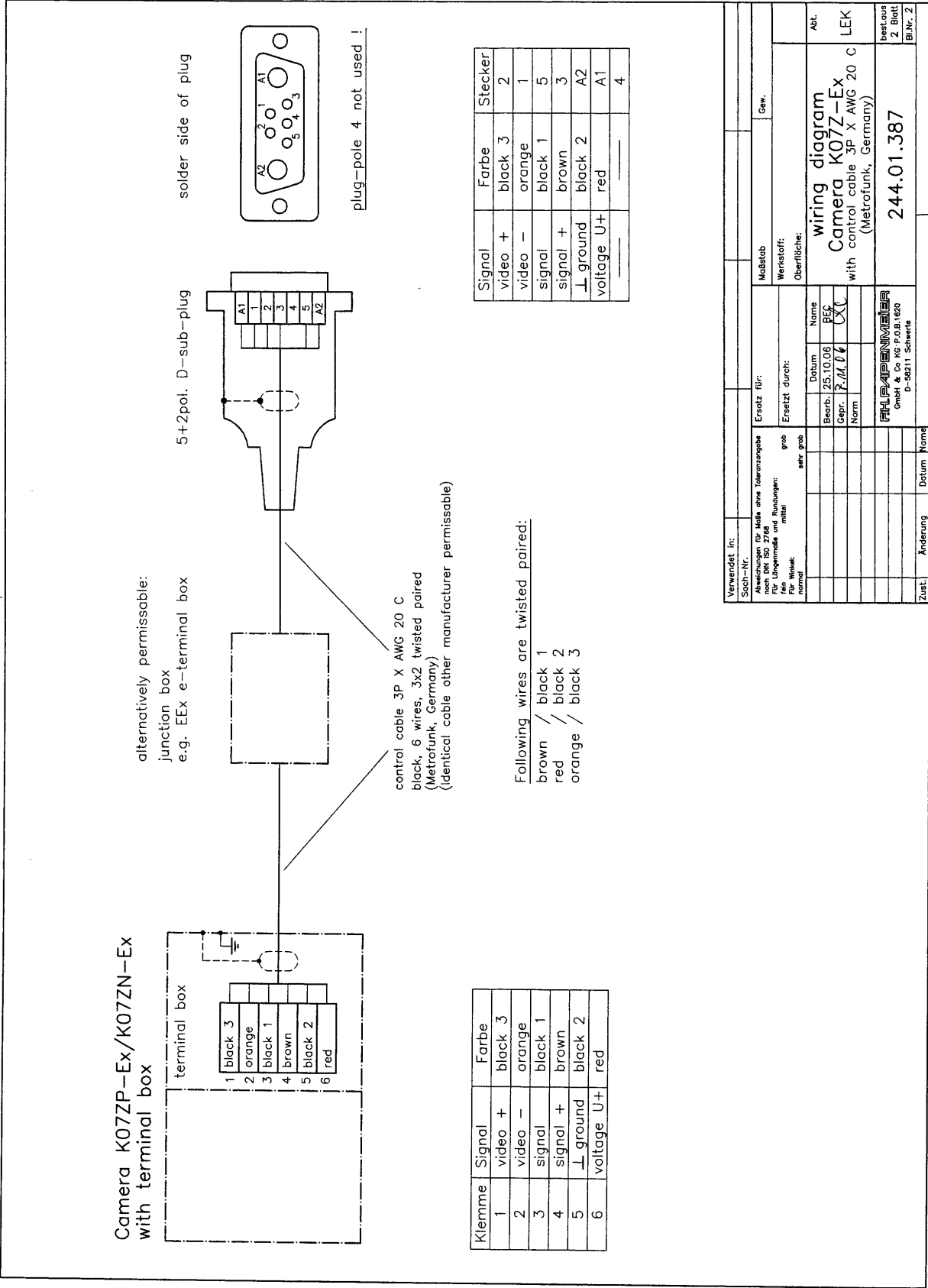


Coax / power cable for K55 / K55-Ex

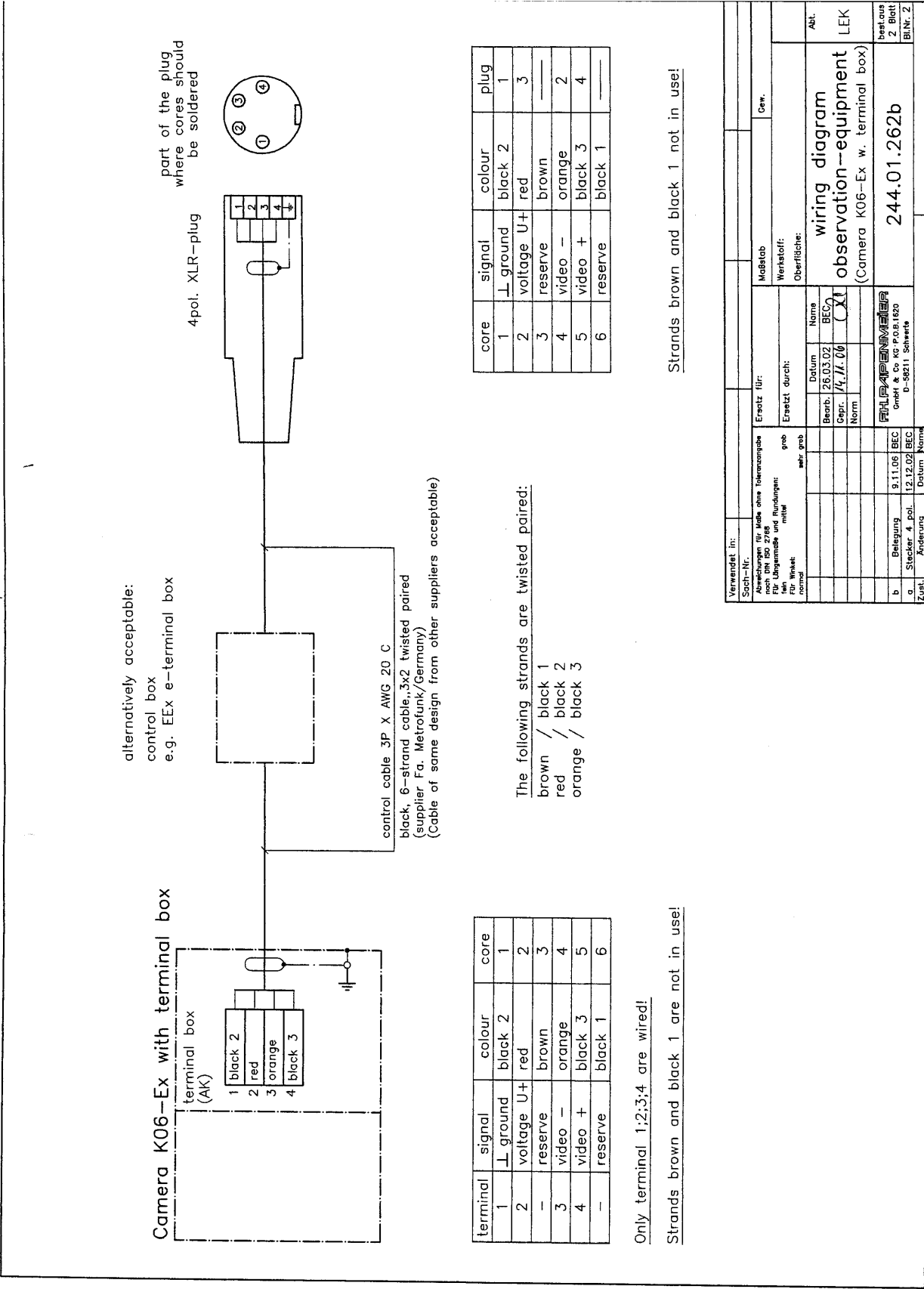
5.1 Terminal diagram K25-Ex



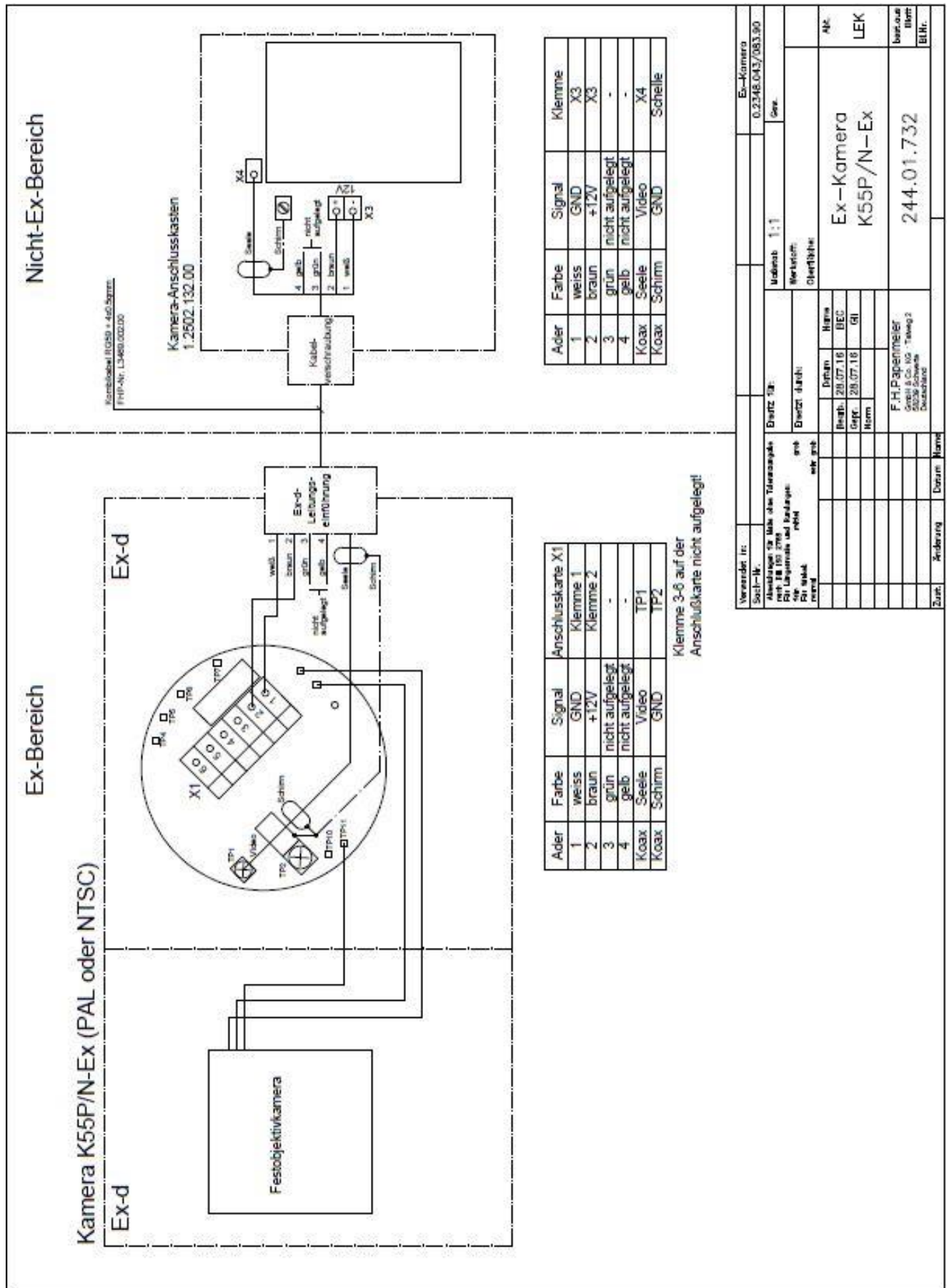
5.2 Terminal diagram K07-Ex



5.3 Terminal diagram K06-Ex



5.4 Terminal diagram K55-Ex



6. Control devices

Racks with one or up to six control units are available as control device for the Lumiglas cameras.

6.1 One-camera-rack



Front one-camera-rack



Back one-camera-rack

The small camera rack is designed for one camera. An enlargement with a second camera is not possible. The connection possibilities are the same as per the large rack.

The power consumption of the small rack is 15 Watt maximum. The fuse protection of the rack is required with 1.6 A. The reason therefore is the starting current of the control card switch power supply unit.



Camera-rack for K06

6.2 6-camera-rack



Front 6-camera-rack (K25 or K07)

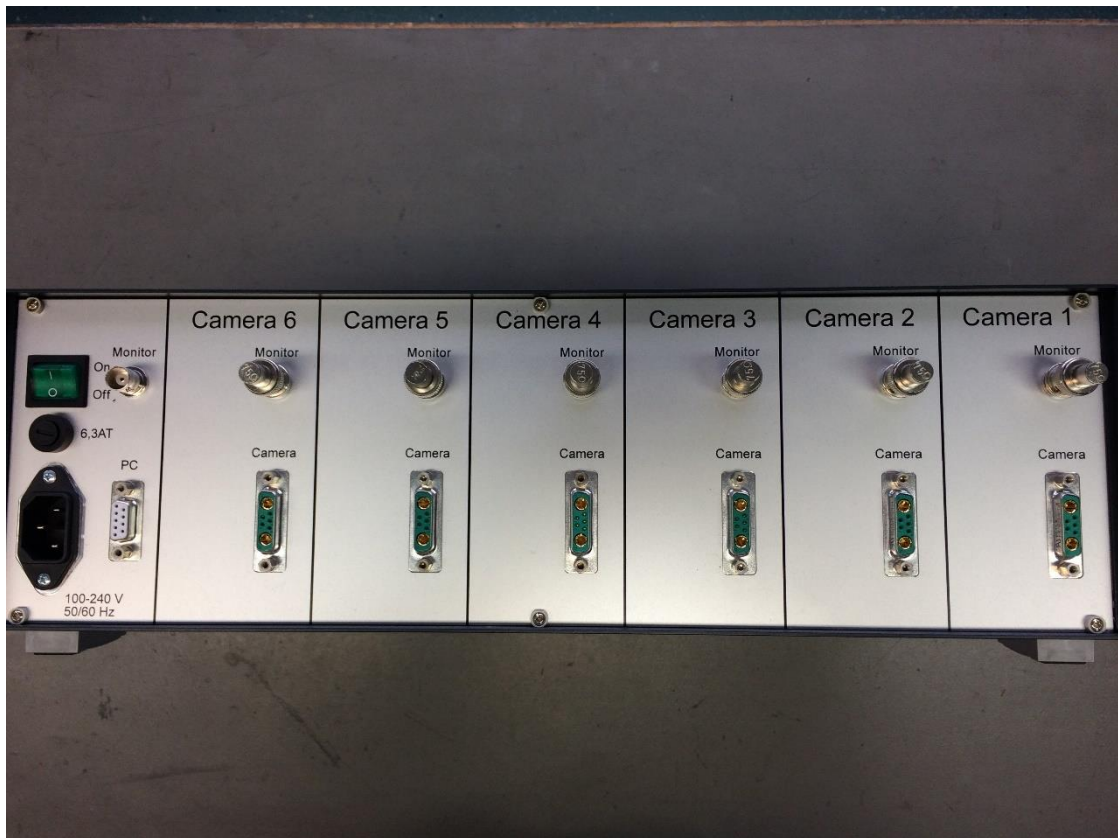


Front 6-camera-rack (K06)

The 6-camera-rack is used when a problem requires several cameras or when more cameras have to be installed later.

The rack has a 5 Watt base load. This base load increases by 10 Watt per installed control card (passive control card), by 15 Watt (active control card), thus reaching a maximum of 95 Watt. A fuse protection of the rack is required with 6.3 A. The reason therefore are the starting currents of the control card switch power supply units.

6.3 Connections



Backside 6-camera-rack

The power supply of the rack will be effected over a power cable with rubber connector. The connector is in local standard way. The supply voltage has to be between 90 and 260 volts (power frequency 50 – 60 hertz).

For each camera is an integrated 7-pole-combi connector at the backside of the rack. The 24 V power supply will be done over the two stronger pins, the other pins are reserved for the control cable and the video signal.

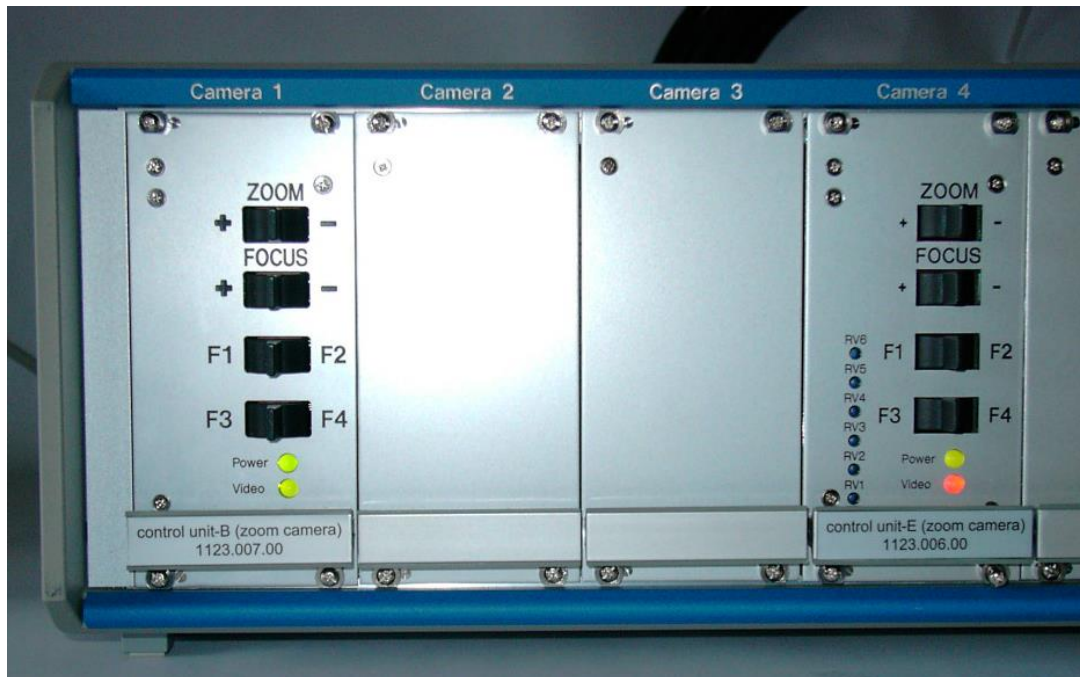
At the backside of the rack, each camera has a BNC-output for the directly connection to a monitor. If you don't connect it directly to a monitor, it could be necessary to use a 75 ohm terminating resistor on the BNC-output. The terminating resistor is necessary, if the video image is overdriven (active sensitive automatic).

Each large rack has a reversible BNC-output where each camera could be connected to.

The 9-pole serial port on the back of the rack is the serial connector for the computer. If you want to control the cameras with the LumiCam software (without network interface module), you have to connect this port with a free serial port of the computer (Com1, ... Com9). The parameters are: baudrate 9600 baud, 8 data- and 1 stopbit, no parity, will be set by the program.

6.4 Control units

Cameras with active video transmission system.



Active control unit in 6-camera-rack

On the front panel the units are equipped with 4 flip keys to control the corresponding camera and 2 two-coloured LEDs.

The Power-LED indicates the supply voltage of the unit. It turns to green when the power provided rack is switched on and the control program has been started.

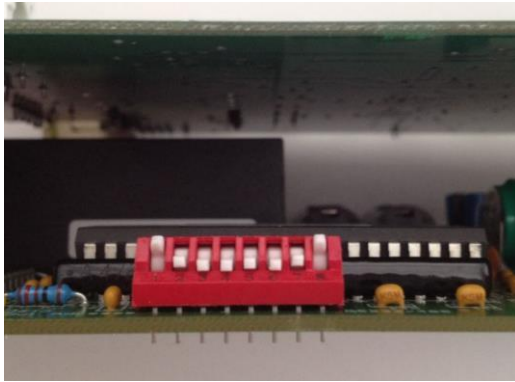
The video-LED starts with red light. The LED changes to orange during the camera initialisation. In case no camera is connected, the LED stays red.

At the small rack, the video-LED switches to green after initialisation.

At the large rack, the green video-LED shows the camera where the video signal is on the common video output. When the LumiCam Control Program is active, this camera can be controlled by the LumiCam software.

Every control card has 3 fuses – one 1A primary fuse and two 315mA, one for the power supply of the camera and the other for the power supply of the control cards.

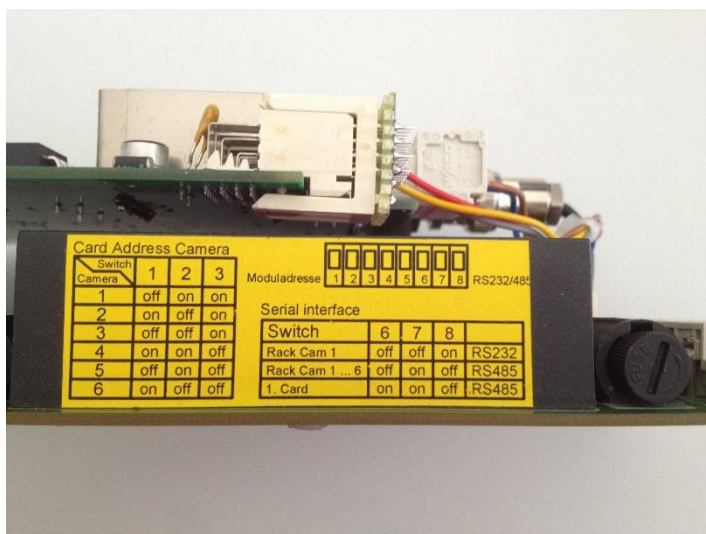
Every control card is equipped with a small operating-voltage-independent memory and a real time clock chip.

**DIP-switch**

Example:

1 = off, 2 = on, 3 = on, 4 - 7 = off, 8 = on

On the control card is an 8-pole-DIP-switch integrated. With this switch you can adjust the camera addresses and the serial interface mode. The addresses are comment on the outside of the power supply pack (yellow label).

**Label with DIP-switch settings**

The unit address is between 1 and 6 and identifies this unit when the cameras are controlled with the LumiCam program.

camera address	sw-1	sw-2	sw-3
1	off	on	on
2	on	off	on
3	off	off	on
4	on	on	off
5	off	on	off
6	on	off	off

The control cards inside the large rack are connected via RS485 port. The connection to a computer is the same as well as the small rack, via RS232 port. Because of that, each signal will go through a RS485/RS232 transformer. It is necessary to put on the terminating resistor on the leftmost unit, because a RS485-port connection requires a termination.

settings		sw-6	sw-7	sw-8
a	Control unit in one camera rack	off	off	on
b	Control unit in 6 camera rack	off (see settings c)	on	off
c	Leftmost unit in 6 camera rack	on	on	off

6.4.1 Activ unit



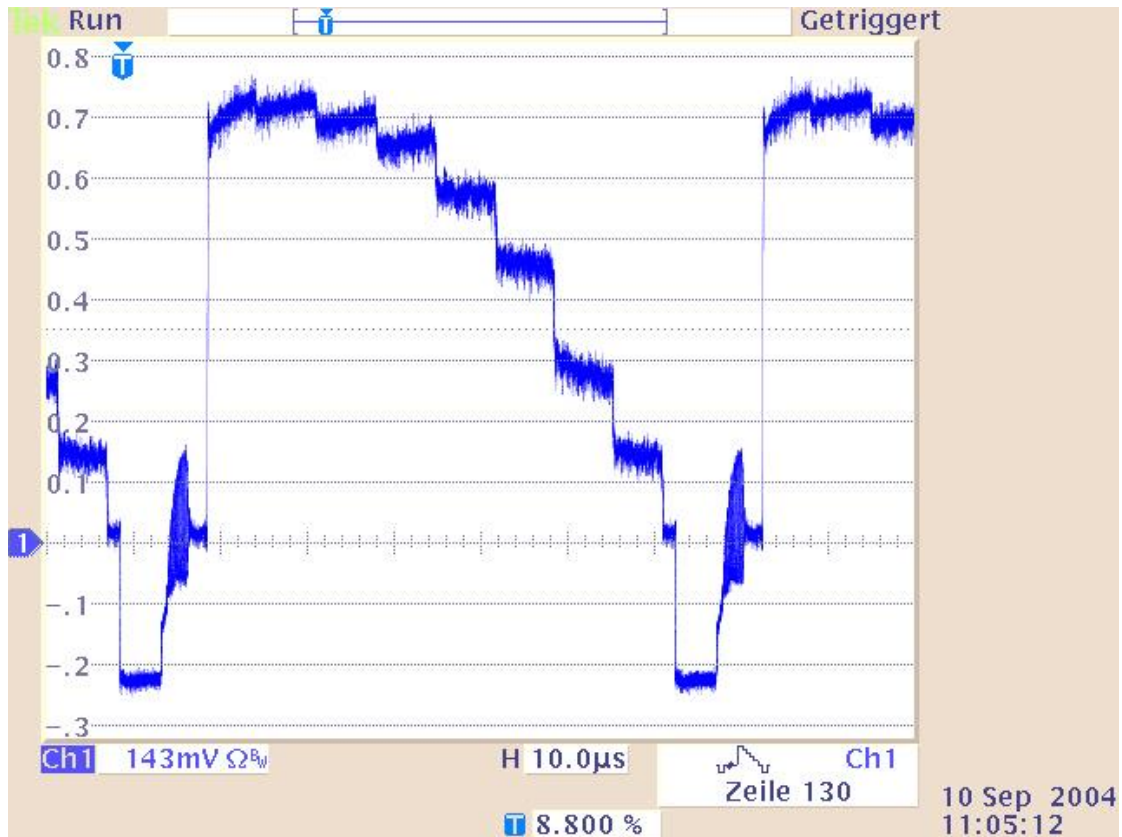
Active unit with video amplifier card

The control unit is equipped with a video amplifier card. By the adjustment possibilities, a concerted overhaul of the received video signal is possible. Because of the video amplifier we can reach the cable length up to 500m.

The calibration of the video amplifier card will be effected with potentiometer RV1 RV6 (video amplifier card EV-225) or RV1 RV3 (video amplifier card EV-230) at the front of the rack (through drillings in the front panel).

Using a video-signal-generator or a test picture (e.g. chapter 4.2.2.1) and an oscilloscope, you will obtain an excellent system balance. You can connect the oscilloscope parallel to the monitor with the aid of a BNC-T-plug at the monitor output. With a time base of $10\mu\text{s}/\text{div.}$ and a voltage adjust of $0,1\text{V}/\text{div.}$, a whole monitor row will be presented on the oscilloscope screen.

The destination of the adjustment should be to reach a curve shape on the oscilloscope as shown in the following picture.



The adjustment procedure should be considered as guideline only – please note that the adjustments are not working fully independently. For example, altering e.g. the RV2 will, to a certain extent, influence the frequency response adjusted by RV3 etc. Consequently several readjustments of each adjustment might be necessary.

In case no oscilloscope is available, balancing has to be done according to the optical impression. Please consider the balancing-sequence described above as basis.

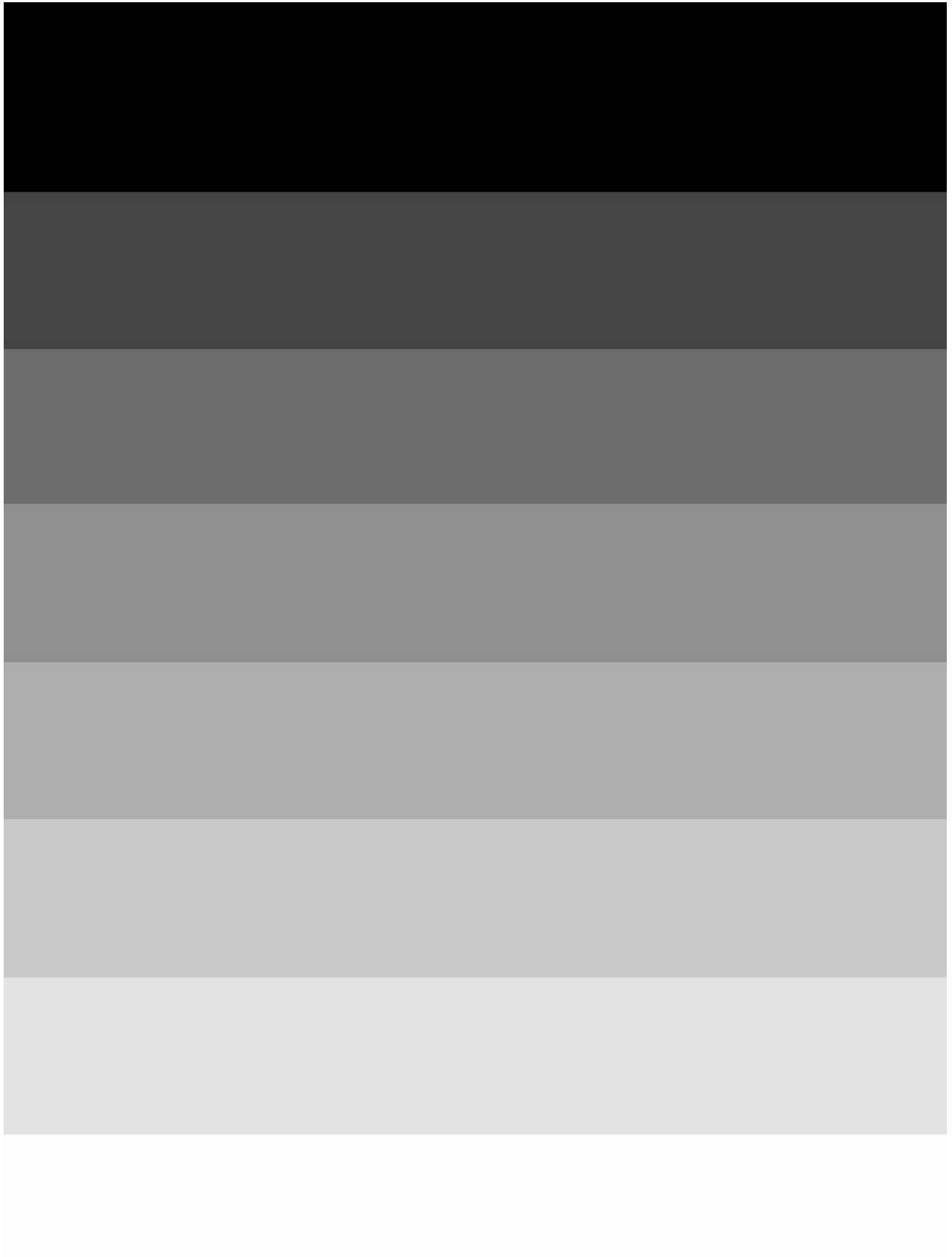
6.4.2 Video amplifier card EVR-225

- a) Turn all adjustments fully counter clockwise
- b) RV1: Adjust to 1 Vpp output (incl. sync. pulse)
- c) RV3: Adjust the shape of the synchronisation pulse
- d) RV2: Adjust the middle frequency of the signal
- e) RV6: Adjust the high frequency part of the signal

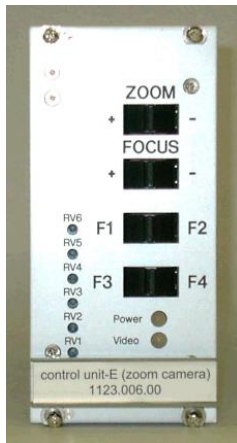
6.4.3 Video amplifier card EVR-230

- a) Turn all adjustments fully counter clockwise
- b) RV1: Adjust to 1 Vpp output (incl. sync. pulse)
- c) RV3: Adjust the shape of the synchronisation pulse
- d) RV2: Adjust the middle and high frequencies of the signal

6.4.4 Test picture



6.5 Control keys



The flip keys on the control unit

It is possible to control the basic functions of a camera by the flip keys "Zoom" and "Focus". Additional camera functions can be activated / deactivated with the function keys "F1" ... "F4".

6.5.1 - Zoom

You can adjust the camera Zoom using the +/- ZOOM flip key of the control unit. The adjustment is infinitely variable. The Zoom camera lens is adjusted first. When the digital zoom is activated, zoom adjust automatically turns into digital Zoom.

6.5.2 - Focus

Utilise the +/-Focus key to manually correct the focus. Being activated, the autofocus is switched off first. Then, the focus will be manually corrected.

6.5.3 - F1

Using the F1-key, you can reactivate the autofocus which has been switched off during manual focus adjust.

6.5.4 - F2

Pressing the F2-key, the data screen will be switched on or off – if active. When the data screen is activated, current camera settings will be masked into the camera picture.

6.5.5 - F3

Use the F3-key to switch the video signal of the camera to the reversible video output in the 6-camera-rack.

6.5.6 - F4

Using the F4-key masks the "date and time"-function into / out of the camera picture. When you switch on the rack while the "date and time"-function is activated, the current date and the current time of the card will be transferred to the camera. In case the function is deactivated, the transmission process will be started as soon as the function has been switched on.

Attention:

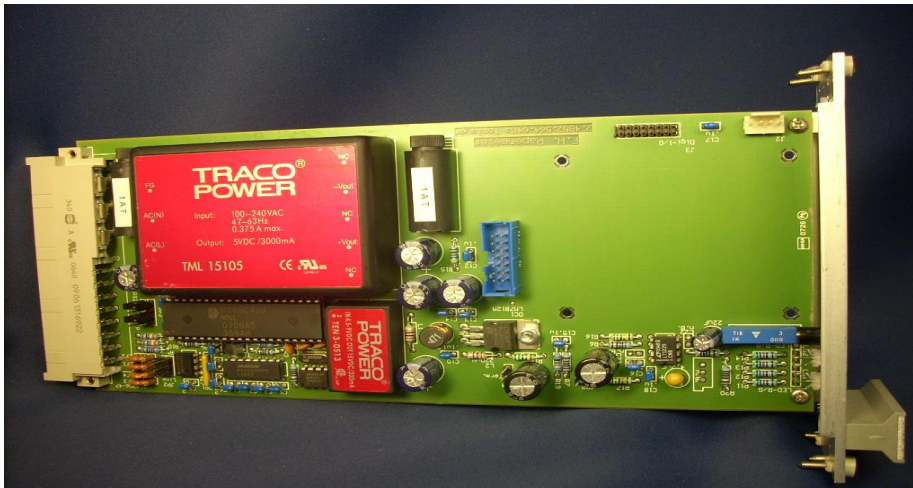
Please Note: Do not control the camera by the keys of the units when the LumiCam program is activated. In fact, it is possible to control the camera by the unit (active LumiCam program), but the changes made from the unit will not be registered by the LumiCam program.

Example: When the Zoom is adjusted from the unit, the LumiCam pointer in the LumiCam program stays at it's current position until the Zoom is adjusted by the LumiCam program.

Power Supply / Video server I

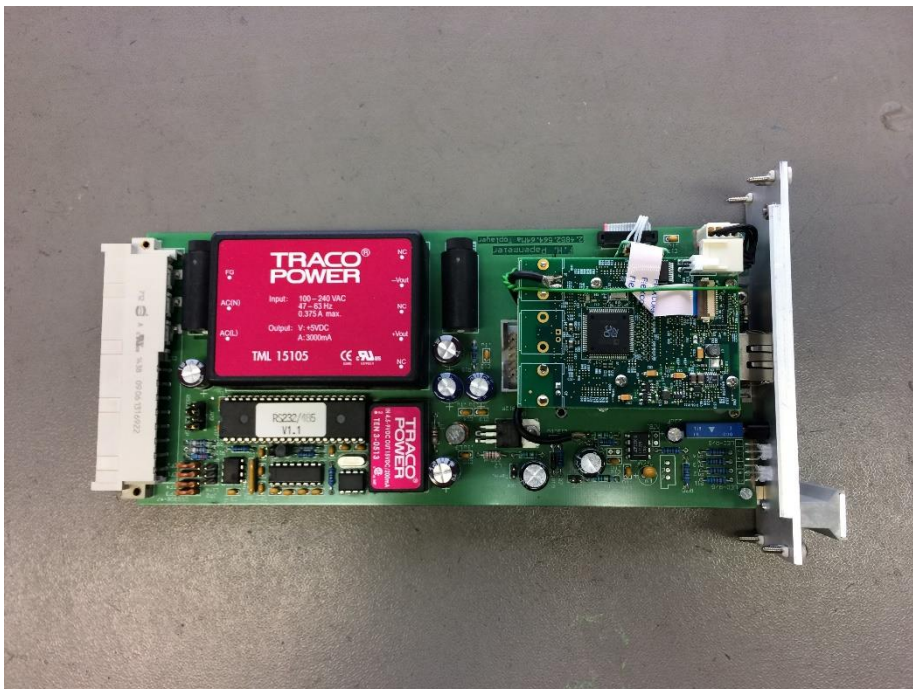
Power Supply for 6 camera-rack

- Power Supply
- Video Amplifiers
- Interface Converter (RS232 / RS485)
- Video-Multiplex-Output (VMO)



Power Supply / Video server with Ethernet (100/1000 Mbit)

- Power Supply
- Video Amplifiers
- Interface Converter (RS232 / RS485)
- Video-Multiplex-Output (VMO)
- Videoserver with Ethernet (100 / 1000 Mbit)



Video server with Ethernet (100 / 1000 Mbit) control with LumiCam-Software 3

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